Rhodora

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THE HEATHER IN NEW ENGLAND.

Wm. P. Rich.

On the twenty-fourth of September, 1899, the writer, happening to be in Tewksbury, Mass., visited the location of the Heather (*Calluna vulgaris*, Salisb.), and it may be desirable to put on record the present condition of this interesting plant as well as some observations on the vexed question of its origin.

Contrary to our usual experience in such matters, no difficulty was met with in finding the place where it grew, so well was the plant known in the town.

It grows upon a hillside pasture sloping gradually down to boggy ground through which a deep channel has been cut by a brook. In the higher part of this pasture a few scattered patches of the plant were noticed, possibly transplanted from the main body of the Heather, and from their feeble appearance seemingly doomed to early extinction. The principal growth was in the lower part of the pasture, on the borders of the brook, where the plants were growing quite thickly in a space about thirty feet square, which was inclosed by a wire fence. At the time of our visit a cow was standing in the midst of the precious shrubs, an invasion not likely to be soon repeated, for visiting the place a second time, some two weeks later, we found the fence had been repaired, showing the watchful care of some interested person over this rare plant. The shrubs were mostly in advanced fruit, although a few of their pretty rose-colored flowers still lingered as a sample of its beauty a month before.

In the thirty-eight years which have elapsed since public attention was first called to the Heather in this locality, the area of its growth has been much reduced, judging from the description published at the

time, and that it is still in existence is doubtless due to the protection which has been afforded it. Since its discovery here several other stations have been found for the Heather in New England. It has been reported from Cape Elizabeth, Maine, from West Andover, Townsend, and Nantucket, Massachusetts, and also from Rhode Island.

In most of these locations careful investigation has failed to prove its introduction by human agency and this has led numerous writers on the subject to claim for it an indigenous origin. Although its early history in New England is shrouded in obscurity, and desirable as it would be to place the Heather on our list of native plants, it must be said, after a careful reading of the literature of the subject, that no satisfactory evidence has accumulated during the years that have passed since its discovery on this continent to substantiate its claim as a plant native to America.

The circumstance that in some instances, as at Townsend, Massachusetts, it has been traced to the planting of seed, and especially the fact that although many wild regions in America seem favorable for its development it has never been found at points remote from human habitation, are much against the theory of its indigenous character.

The occurrence of the Heather in Nova Scotia, Newfoundland, and Greenland has been adduced as strong evidence in favor of believing the plant native in America. But Nova Scotia was settled in part by Scotch, who would have been particularly likely to introduce the Heather accidentally if not purposely; while in Newfoundland — a region of great stretches of open moorland and seemingly an ideal habitat for the Heather, — the plant has only been found in a few patches about the settlements on the southeastern coast, the most thickly populated part of the island. Finally the occurrence in Greenland, although reported, could not be confirmed by Lange, the author of the most complete flora of that region. It will thus be seen that these northern occurrences add little to the evidence, that the Heather is an indigenous American plant.

BARTONIA IODANDRA, — A SPECIES NEW TO THE UNITED STATES.

Emile F. Williams.

(Plate 15, figs 1–7.)

On September 23, 1894, while botanizing in the Blue Hills Park Reservation, near Boston, Dr. Geo. G. Kennedy and the writer collected several plants of Bartonia, which, to their surprise, were growing in sphagnum in a cedar swamp. Their appearance was altogether different from that of *Bartonia tenella*, a species very common in this region, but as Gray's Manual provided no other berth for them, I referred them to this species, thinking the difference in appearance might be due to the unusual habitat in which I found them. Hitherto I had always collected Bartonias in dry cranberry bogs, in pastures and springy fields and even once on a sunburnt ridge of Green Mountain, at Mt. Desert, but never before in deep shade nor in peat moss.

In August, 1894, Dr. B. L. Robinson and Mr. H. von Schrenk secured some specimens of a Bartonia in a small sphagnum bog near Holyrood, on Conception Bay, Newfoundland. These specimens were at first taken to be the obscure species *Centaurella Moseri*, Steud. & Hochst., and as Centaurella had long since been reduced to Bartonia, the plants were distributed as *Bartonia Moseri*, Rob. & Schrenk; but in July, 1898, Dr. Robinson found it necessary to place them in a new species which he called *Bartonia iodandra*,[1] from the purple color of the anthers.

I had never felt satisfied with the disposition made of my Blue Hills specimens, and having occasion lately to visit the Gray Herbarium, I submitted my material to Dr. Robinson, who pronounces it to be *Bartonia iodandra*. My specimens, however, have yellow anthers, but in other respects the flower agrees perfectly with the type specimens from Newfoundland. Their habit likewise is the same, only they are much larger. The Newfoundland type is described as a delicate annual 4 to 12 cm. high, my plants are 12 to 25 cm. high.

Bartonia tenella is usually an erect plant 6 to 20 cm. high, and the stem is either single or divided near the base into two, three or four erect branches. The base is more or less thickly covered with bract-like, mostly opposite scales. The flowers are terminal on short, mostly

1 Botan. Gazette, Vol. 26, pp. 46–48, July, 1898.

opposite branches or peduncles which are seldom 5 mm. long. Some plants which I collected on Cape Cod have opposite branches above, and the flowers are opposite and closely racemose on the ends of these branches. The corolla is one and one-half times the length of the calyx, its segments are rather blunt and often slightly denticulate. The stigma, about 2 mm. long, is slightly exserted.

Bartonia iodandra, on the other hand, is erect, from a more or less decumbent base, but my largest specimen which is 25 cm. high was somewhat nodding. The general appearance of the plant is straggling whereas that of *B. tenella* is very erect and strict. The stem is single in every specimen I have seen and either lacks entirely the basal scales or has only a few, widely separated and alternate. The branches or peduncles are mostly alternate, erect or curved-ascending, 1 to 6 cm. long. The flowers are terminal and somewhat larger than those of *B. tenella*. The corolla is twice the length of the calyx and its lobes are lanceolate and entire. The stigma is short and thick and mostly included within the corolla.

I have said above that the anthers in my specimens are yellow, so that if my plants are *B. iodandra*, as they appear to be, this character is not to be relied upon.

B. iodandra varies from *B. tenella* in appearance, in habitat, in the basal scales, length of peduncles, length of corolla and shape of its lobes, and in the stigma, an array of differences which ought certainly to constitute a valid species. Of the real *B. Moseri* (*Centaurella Moseri*, Steud. & Hochst.) we know very little. In the only specimen which I have seen, which is in the Gray Herbarium, collected by Drummond at Covington, Louisiana, the habit is entirely different from that of either *B. tenella* or *iodandra* and the flowers are very small, hardly half the size of those of *B. iodandra*. To determine whether there is any affinity between this species and *B. tenella* or *iodandra* it will be necessary to have more and better material.

B. iodandra was also collected at Grand Lake, Newfoundland, by Rev. A. C. Waghorne, in August, 1897, and at Cape Breton Island, in August, 1898, by Prof. John Macoun. There is also a specimen in the Gray Herbarium from the herbarium of William Boott, collected in October, 1859, at Weymouth, N. J., which is undoubtedly referable to *B. iodandra*. This New Jersey station and that in the Blue Hills are the only ones within the United States known to the writer, and it is hoped, now that their attention is called to it, that collectors may re-

port their discoveries, so that more knowledge may be obtained of the range of this interesting little plant.

BOSTON.

EXPLANATION OF PLATE 15, figs. 1–7. Fig. 1, *Bartonia tenella*, habital sketch; fig. 2, same, corolla-lobes. Fig. 3, *B. iodandra*, one of the original Newfoundland specimens; fig. 4, corolla-lobes of same. Fig. 5, *B. iodandra*, a specimen from the Blue Hill station. Fig. 6, *B. Moseri*, a specimen from Covington, La.

A LITTLE-KNOWN NEW ENGLAND GOLDENROD.

C. B. GRAVES.

ON October 1st, 1898, specimens of a peculiar Solidago were collected by the writer on the gravelly terrace bordering Poquonnoc River, Groton, Connecticut. The same form was found again last September both at the locality above mentioned and on an open, rocky hillside near the shore, some miles further east. The plant was fairly abundant at both stations, growing with *S. rugosa* Mill., *S. Canadensis* L., *S. sempervirens* L., and *S. juncea* Ait., but having manifest points of difference from all those species.

Careful examination of this material led to the conclusion that it represented a species distinct from any described in the current manuals.

Through the kindness of Mr. Fernald, who examined some of these specimens, I have learned that at various times during a considerable period of years plants seemingly identical with these have been found at several points in eastern Massachusetts. This form was probably referred to by Young in his Flora of Oak Island, Revere, Mass. (1882), as "*Solidago sp.?* Perhaps a cross between *S. sempervirens* and *S. altissima*." This Oak Island station was rediscovered in recent years by Mr. Wm. P. Rich, of Boston, to whom I am greatly indebted for information upon the plant in Massachusetts. What is apparently the same form has been collected also in Medford, Malden, and Winthrop, Mass.

Dr. Gray, to whom most of these Massachusetts specimens were submitted, classed them doubtfully as hybrids between *S. rugosa* Mill. and *S. sempervirens* L. Later students, however, have been more inclined to regard this form as entitled to specific rank. Mr. Wm. P. Rich, who has a thorough field knowledge of the Oak Island plant, has

for several years maintained this view, — an opinion held also by Mr. Fernald. In fact, anyone observing this form attentively in the field could, it seems to me, hardly regard it as other than a good species.

From his study of all this material, Mr. Fernald considers it satisfactorily referable to *Solidago asperula* Desfontaines. Comparison with authentic specimens from the Paris Garden leaves no reasonable doubt that these interesting New England forms are — at least in part, probably all — included in *S. asperula*. That name should, therefore, be reinstated as representing this specific type.

The original description of Desfontaines is as follows:

SOLIDAGO ASPERULA. Caule villoso, asperulo; foliis lanceolatis, levissime serrulatis; racemis elongatis, patulis; floribus secundis.

Caulis 3–4-pedalis, hirsutis, pilis brevibus, asperulis. Folia lanceolata, glabra, levissime serrulata. Flores racemosi, terminales. Racemi longi, paniculati, patentes. Flores numerosi, parvi, secundi, lutei. Rami pubescentes. — Desf. Cat. ed. 2, 403.

From recent material the species may be characterized as follows:

Stems from horizontal rootstocks, rather stout, erect, 2½ to 4½ feet tall, simple or branched at the summit, commonly deep purple, papillose, slightly scabrous to moderately pubescent, very leafy; branches leafy, papillose pubescent with short whitish hairs; leaves absent or shrivelled at and near base of stem at flowering time, largest below (4 to 7½ inches long, ¾ to 1½ inches wide), erect or ascending, thickish and usually somewhat rugose, smooth scabrous or sparingly pubescent, pinnately veined, rarely somewhat triple-nerved, oblong or elliptical-lanceolate to linear-lanceolate, acute, sessile or the lower tapering into margined petioles, entire to sharply serrate, the margins very rough; leaves of branches much smaller, passing into the bracts of the racemes; inflorescence paniculate, varying from simple small and close to large open and compound forms, often markedly corymboid; racemes densely or loosely flowered, strongly secund, often recurved, pubescent with whitish hairs; heads comparatively large (2½ to 3½ lines high); involucral scales imbricate in 4 to 5 rows, cilate, the outer herbaceous, lanceolate-subulate, acute, puberulent on the back, the inner oblong-lanceolate to linear-oblong, obtuse or obtusish with scarious margin and tip, smooth or minutely scabrous on the back; rays 8 to 16 (usually 10 to 13), golden yellow, large (1–1⅜ lines x ⅜–⅝ line); disc flowers 6 to 14 (usually 8 to 11), their corollas tubular campanulate, abruptly contracted midway; achenes pubescent (about 1 x ¼ line), linear oblong, slightly flattened.

Hab. Eastern Massachusetts and southeastern Connecticut in dry or dryish open soil.

In bloom during the last three weeks of September, most of the

plants being in best flowering condition during the second or third week, but a few prolonging its season into the first week of October. The discs, which at first are yellow, turn as they mature a purplish brown before any change takes place in the rays; thus flowers which have somewhat passed their prime show a marked color contrast between rays and discs.

Solidago asperula Desf. as here treated is a variable species, including several more or less well-marked forms. In the field, however, it has an aspect of its own, and is almost always easily recognizable at sight.

Its nearest relative is *S. rugosa* Mill., which also it most resembles in habit, but it is readily distinguished from that species by its smoother stem, its longer, smoother, less rugose, more erect leaves, and its much larger heads, with more numerous ample rays.

S. ulmifolia Muhl. inhabits wet ground, blooms a month or more earlier, and furthermore differs from *S. asperula* in its smooth stem and small heads, with few rays.

From *S. sempervirens* L. it is easily separated by its more slender, rougher stem, its thinner, smaller usually serrate leaves, its more open, broader panicle, and its smaller heads. Moreover, the seaside goldenrod has usually an abundance of basal leaves at flowering time, which is not the case with *S. asperula*.

Some forms suggest *S. Canadensis* L., because of their narrower somewhat triple-nerved leaves, but they are never as distinctly 3-ribbed as in that species. It is further distinguished from *S. Canadensis* by its smoother stem and leaves, and larger heads, with numerous broad rays.

From *S. Elliottii* Torr. & Gray its more or less rough papillose stem, its longer, narrower more erect leaves, the lower of which are often petioled, its broad rays, and its open paniculate or corymbose-paniculate inflorescence serve to differentiate it. Furthermore, *S. Elliottii* is an inhabitant of wet meadows and swamps, while *S. asperula* seems to prefer dry or dryish soil.

The writer is under great obligation to Mr. M. L. Fernald of the Gray Herbarium for indispensable aid in the preparation of this paper.

THE RE-DISCOVERY OF ELEOCHARIS DIANDRA.

M. L. Fernald.

Nearly twenty years ago Charles Wright collected on high sand-bars of the Connecticut river, between Hartford and Wethersfield, a little spike-rush, which was unlike any other known species. Its most marked characteristic was the lack of bristles which, in this genus, usually occur at the base of the achene, probably representing the perianth of higher endogens. The plant was further distinguished by its very small inverted-pyriform achene, capped by a small compressed tubercle. After corresponding with Dr. Gray in regard to his plant, Mr. Wright in 1883 described it as *Eleocharis diandra*. Since then nothing has been known of the species except from the original specimens. Recently, however, Mr. C. H. Bissell, taking advantage of the extremely low water of the Connecticut in the fall of 1899, has explored the sand-flats along the river at East Windsor, Connecticut. There he finds the plant described by Wright, but most of the material differs markedly in habit from Wright's specimens. The original *Eleocharis diandra* was an erect plant with many slender culms. Though Mr. Bissell finds this erect plant, the common form at East Windsor has the culms decidedly prostrate and of very unequal lengths, a variation from the type parallel with *E. ovata*, var. *Heuseri* (see Contrib. Gray Herb. xv, Proc. Am. Acad. xxxiv, 486–489, 494). Assured by Mr. Bissell's re-discovery of this unique *Eleocharis*, President Ezra Brainerd felt that it should be expected along the entire Connecticut Valley. Accordingly as occasion has offered, he has looked in the proper situations for it at points in New Hampshire, Vermont and Massachusetts and finds at them all the same prostrate form which abounds on the sand at East Windsor.

This form, differing so strikingly in habit from the original erect plant of Charles Wright, may be called —

Eleocharis diandra, C. Wright, var. **depressa**. Culms of very various lengths, depressed and prostrate, forming flat rosettes. Sand-bars and flats of the Connecticut river, New Hampshire, Walpole, Sept. 30, 1899 (*Ezra Brainerd*) : Vermont, Westminster, Sept. 30, 1899 (*Ezra Brainerd*) : Massachusetts, Northampton, Oct. 11, 1899 (*Ezra Brainerd*) : Connecticut, East Windsor, Sept. 17, 1899 (*C. H. Bissell*). A discussion and figures of Mr. Wright's species will be found in the paper by the present writer cited above (Contrib. Gray Herb. xv, 489, 496, figs. 53–58).

Gray Herbarium.

Eleocharis diandra in Central New York. — It will be interesting to all lovers of cyperaceous plants to know that the long-neglected and little-known *Eleocharis diandra*, so well described by Charles Wright, Bull. Torr. Club, x. 101, has at last been found in sufficient quantity to determine its merits as a good species, concerning which there can no longer be any doubt.

On making a thorough examination of some specimens of an Eleocharis, which I had gathered in July, 1883, on the sandy borders of Oneida Lake, in the towns of Verona, Oneida county, and Lenox, Madison county, and which had been taken to be a form of *E. intermedia* Schultes, I was at once attracted by the beautiful little *cuneate-obovate* achenes and lack of any bristles. My suspicions were aroused, and on referring to Mr. Fernald's Contributions from the Gray Herb. New Series, No. xv. 496, *E. diandra* C. Wright, with the accompanying plates, seemed to solve the doubt, and specimens were sent to Mr. Fernald, who has kindly verified the determination.

The plant was found in company with *Cyperus aristatus* Rottb. and *Hemicarpha subsquarrosa* Nees., and is very common in the Oneida Lake locality. Its recent re-discovery in the Connecticut Valley and my own finding of it at a station somewhat identical, confirms me in the opinion that it has merely been overlooked in other places, and that it will be found in intermediate and similar localities, and eventually receive the attention it deserves, and add honor to the memory of the lamented New England botanist, who first described the species. — Joseph V. Haberer, M. D., Utica, N. Y.

A LIST OF MOSSES COLLECTED AT KATAHDIN IRON WORKS, MAINE.

Elmer D. Merrill.

The following list of mosses and scale-mosses were collected in the vicinity of Katahdin Iron Works, during a stay of one day at that place, in November, 1898. This region appears to be very rich in moss flora, and it is a matter of regret that more time could not have been given to collecting at this place.

The species marked with an asterisk have never before been reported in print from the state, and the number of species new to the state in this short list, gives some idea of the amount of work yet to be

done in this group by Maine botanists. I am indebted to Prof. L. S. Cheney of the Univ. of Wisconsin, for various determinations.

The following five species were very abundant on wet soil about the iron deposit about a half mile from the Iron Works, and were the only species noticed at this place. The large amount of iron in the soil being apparently very favorable for their development.

Bryum caespiticium L. (no. 156).

**Dicranella cerviculata* Schimp. (no. 18).

**Ditrichum vaginans* (Sulliv.) Hampe. (no. 53).

Pogonatum tenue (Menzies) E. G. Britton (no. 180).

Chiloscyphus polyanthos (L.) Corda. (no. 19).

The remaining species listed below were mainly collected on Chairback Mountain, which has an altitude of about 2,000 feet and is nearly six miles from the Iron Works. As it was necessary to make this trip and return to the Iron Works in time to get the afternoon train, very little time could be given to collecting, and therefore the following list does not fully represent this region. Among the more notable species are *Amblystegium irriguum spinifolium* Schimp. and *Leskea nervosa* Myrin., the former being very rare in America.

**Amblystegium irriguum spinifolium* Schimp. (no. 319).

Andreæa petrophila Ehrh. (no. 3).

**Anomodon attenuatus* Hueben. (no. 267).

Anomodon apiculatus Br. & Sch. (no. 267).

Brachythecium campestre Br. & Sch. (no. 299).

Brachythecium Novæ-Angliæ (Br. & Sch.) J. & S.

Brachythecium oxycladon (Brid.) J. & S.

**Brachythecium populeum* (Hedw.) Br. & Sch.

Brachythecium salebrosum (Hoffm.) Br. & Sch.

Catharinea undulata (L.) Web. & Mohr. (no. 178).

Dicranum Bonjeani De Not. (no. 19).

Dicranum longifolium Ehrh.

Dicranum undulatum Ehrh.

Eurhynchium strigosum (Hoffm.) Br. & Sch. (no. 303).

Fissidens adiantoides (L.) Hedw. (no. 39).

Fontinalis antipyretica gigantea Sulliv. (no. 184).

Georgia pellucida (L.) Hedw. (no. 169).

Grimmia apocarpa gracilis (Schleich.) Web. & Mohr. (no. 88).

Hylocomium umbratum (Ehrh.) Br. & Sch. (no. 323.3).

Hypnum Crista-castrensis L. (no. 322.10).

Hypnum Haldanianum Grev. (no. 322).
Hypnum ochraceum Turn. (no. 322.11).
Leskea polycarpa Ehrh. (no. 265).
**Leskea nervosa* (Schwaegr.) Myrin.
Mnium sylvaticum Lindb. (no. 160).
Plagiothecium denticulatum (L.) Br. & Sch. (no. 314).
Plagiothecium turfaceum Lindb.
Pogonatum alpinum (L.) Roehl. (no. 180.)
Raphidostegium recurvans (Mx.) J. & S. (no. 307).
Rhynchostegium rusciforme (Neck.) Br. & Sch. (no. 305).
Sphagnum acutifolium (Ehrh.) Russ. & Warnst. (no. 4).
**Sphagnum acutifolium purpureum* Warnst.
Sphagnum acutifolium rubrum (Brid.) Warnst.
Thuidium delicatulum (L.) Mitt. (no. 274).
Thuidium recognitum (Hedw.) Lindb.
**Thuidium scitum aestivale* Aust.
Webera sessilis (Schmid.) Lindb. (no. 172).

SCALE-MOSSES.

Geocalyx graveolens (Schrad.) Nees (no. 17).
Plagiochila asplenioides (L.) Dum. (no. 20).
Scapania nemorosa (L.) Dum. (no. 15).
Trichocolea tomentella (Ehrh.) Dum. (no. 7).

WASHINGTON, D.C.

THE RELATION OF CERTAIN PLANTS TO ATMOSPHERIC MOISTURE.

ROBERT G. LEAVITT.

(Concluded.)

ORCHIDS (continued). A very few figures will convey a more precise idea of the behavior of cut roots in a humidity of from .90 to .95, mostly nearer the higher figure.

Species.	Wt. at start. Gms.	Time elapsed.	Conditions.	Loss. Gms.	Temperature.
Dendrobium nobile.	.535	24 hrs.	In lab.	.095	70° ±
	.440	46 hrs.	.95 ± hum.	.040	66°–69°
Dry weight	.340				
Burlingtonia decora.	.310	4 days	"	.040	"
Oncidium varicosum.	1.10	2 days	"	.08	"
Dry weight	.21				

The dry weight was determined after heating for a while in a sterilizing oven at above 100° C.

The *Dendrobium* root at the beginning of the test contained water to the amount of .36+ of the root's total weight. In 24 hours in a damp laboratory it lost .48+ of the above water. At once thereafter, in 46 hours in the damp-box it lost .40 of the water remaining. At the end of the test the water left in the root formed .15 of the total weight. The *Oncidium* root had been somewhat dried. Its percentage of water was then .80+, but it lost water much less rapidly than the *Dendrobium*, the water still retained after 48 hours in the box being .79 of the whole weight. In a root of *Brassia Wrayae* the proportion of water had fallen from .78 to .73 of the whole weight after 46 hours in the box.

These figures indicate a very good reason why the roots used have no observable condensing power. Even when dry to the touch and apparently in condition to absorb vapor they still hold a considerable percentage of water. Their state is quite different from that of freshly prepared charcoal, for instance, the activity of which in absorbing gases is so remarkable. The walls of the velamen of the orchid root are already saturated with moisture drawn from the living cells; and in the cases under observation draw away and give off so much water that the living cells perish.

Whole plants were used as follows, the first method being that proposed by Dr. Goodale.

A young shoot of *Dendrobium nobile*, bearing two leaves less than two inches long, and provided with aërial roots aggregating 28 inches in length, was cut from the parent plant, the cut sealed, and the young plant left to dry for several days. Medium weight sheet rubber was tied over the mouth of an inverted beaker. Through a puncture the transpiring parts of the young *Dendrobium* were introduced into the space thus formed, and the receptacle was made as nearly air-tight as possible. While the roots were thus left free, and the shoot was under fairly normal conditions, no moisture could escape except from the roots. If these condensed vapor the plant and whole apparatus would gain weight. Calcium chloride in a test tube had been included along with the shoot in order to take up moisture evaporating from the leaves.

After weighing, this apparatus was set so that the roots of the plant hung in a box of the kind before described, the beaker and contained shoot being at the same time exposed to the light. A control appara-

tus, lacking a plant, was also used and weighed in the same way as the first. This suffered slight changes of weight, by evaporation from the rubber, but these were always trifling compared with the losses of the other contrivance.

The experiment was repeated with another young *Dendrobium* plant having three small leaves and 96 inches of roots. No calcium chloride was used.

The tests lasted four, five, and six days respectively. Every successive weighing showed a somewhat diminished weight. In three days, through the 28 inches of slender and dry roots of the first plant about .07 gram was lost. The second plant lost about the same amount in like condition in the same time. In both cases the leaves were transpiring; and the test was carried on until the second plant was plainly suffering for want of water, although the air about the roots was very nearly (.95) saturated with water-vapor.

These two Dendrobiums, with still a third, have been hung unprotected in a greenhouse where the atmosphere is well charged with moisture, and from time to time their weights have been determined. No. 1, though not watered for seven weeks, is green and healthy. The stem is somewhat shrivelled. It has lost .57 gram weight in the last 20 days, a little more than one-eleventh of the present gross weight. The others also slowly decline in weight.

It remains to be proved conclusively that the roots of any orchids possess a special condensing power. The fitness of the velamen for such a function may well be classed with the "evident" adaptations.

Tillandsia. A piece of *T. usneoides*, which had hung in the greenhouse, was tested in the damp-box in the same manner as the orchid roots. Tips here and there finally dried up and died, and the whole lost weight continuously for a long time. This plant probably has no power of absorbing water in the gas form.

Mosses. The reservoir-cells of *Sphagnum* and *Leucobryum* in some respects resemble the tracheid-like elements which give the covering of the orchid root its peculiar spongy character. Kerner attributes to them the same function, viz., the appropriation of water-vapor from the atmosphere at those seasons of the year when the supply from the ground is cut short by drought.

Leucobryum, sp. December 19, the moss was gathered in a dryish condition. It was left in the laboratory for two days, when it seemed very dry to the touch. It was then weighed and put into the box.

December 21, 9.30 A. M., it weighed .337 gram.
December. 22, 4.45 P. M., it weighed .230 gram.
December 28, the weight had not apparently changed.
Dry weight, .195. Humidity during test, about .93.

Thus in 31 hours the percentage of water fell from .42 to .15, when equilibrium was reached.

Sphagnum, sp. The material was picked from a recently collected but pretty dry heap of the moss, and the dead portions removed, leaving tips perhaps two inches long. One lot was weighed as it came from the shed — wt. .810 gram— and put into the box. In one day the weight fell to .555 gram. Then being dried out to .495 gram, and again subjected to the action of the moisture, the sphagnum increased its weight to .530 gram in six days, and .540 gram after a further exposure. Dry weight, .420 gram.

The second lot was kept in the laboratory for two days, when it seemed utterly dry to the touch, but was still alive and green. Weight, .620 gram. Seven days later it weighed .630 gram. Dry weight, .500 gram.

In both cases there was some intake of water-vapor. In one the percentage of water rose to .20, in the other to .22. At best the moss remained in a state of relative desiccation.

It was hard to believe that the power of vapor-absorption detected could be of any practical importance in the economy of the plant, at least under the natural conditions prevailing in this part of the world. This conclusion is confirmed by the following observation. Both *Sphagnum* and *Leucobryum*, killed and dried at 100° C. and then replaced in the moistening chamber, rapidly took up vapor. In less than 24 hours the water contents of the dead moss thus derived, equalled that left when the living plants were allowed to dry out for one or two days in the same receptacle.

LICHENS. As compared with the other plants experimented upon, lichens show a considerable power of condensing atmospheric moisture. But though the absorption is enough to render lichens that come from outdoors in a harsh and brittle condition soft and flexible after a day or so, the highest proportion of water obtained by imbibition of vapor is very far below that which the lichens hold when well saturated by dew, rain, or soil-water.

The following figures will serve for illustration. *Usnea barbata* is the common much-branched lichen growing in tufts on the twigs and

trunks of trees. *Stricta pulmonaria* is a large thalloid, or flattened form clinging loosely on rough bark. "Wet weight" was taken after soaking in water and allowing to dry until no water appeared on the surface, "dry weight" after heating.

Species.	Wt. at start. Gms.	Time elapsed.	Humidity, etc.	Loss. Gms.	Gain. Gms.
Usnea barbata.	3.320	4 days.	.93–.95	.800	
	2.520	4 days.	In lab.	.485	
	2.035	3 days.	.93–.95		.245
Wet weight,	4.650				
Dry weight,	1.680				
Sticta pulmonaria.	2.320	1 day.	.93–.95.		.147
	"	25 days.	"		.250
Wet weight,	5.240				
Dry weight,	1.860				

One more table is added, designed to give a rough idea of the relative store of water retained after exposure in an atmosphere nearly saturated with water-vapor.

Species.	Percentage of water when well moistened.	Percentage after stay in box.	Time in days.
Usnea barbata.	.64	.26	+3
" "	.53	.20	+7
Cladonia rangiferina.		.20	+7
C. cristatella.		.25	±3 [1]
C. pyxidata,	.63	.22	−10
C. furcata.	.69	.36	−7
Baeomyces roseus.	.75	.20	−9
Parmelia caperata.	.54	.24	±3[1]
Sticta pulmonaria.	.66	.27	+25

The positive and negative signs in the last column indicate whether the lichen was originally dry and had gained weight, or moist and had lost weight.

The figures are not presented as in any sense physical constants, but merely to show in a general way the relation of some lichens to a possible source of replenishment of their water supply in cases of the failure of atmospheric precipitation. After long exposure to very moist air the lichens possessed, it will be seen, but a low proportion of water. In outdoor humidities this would be still less considerable, and the quantities of water received in the form of vapor must be next to nothing in very dry weather. On the other hand in damp weather

1 Two tests, three days losing, three days gaining; result about the same.

dew falls and is taken up in such measure by lichens that their tissues cannot be in condition to absorb vapor.

General Conclusions. Experiments have been made upon several classes of plants—some of them not mentioned above—which are asserted by one authority or another, of greater or less trustworthiness, to profit largely by their power of absorbing water in the gas form. A few figures, representative of a considerable number of tests, have been given in these notes. While these tests have seemed conclusive as regards the identical material employed, a much longer investigation would be required to enable one to make a general statement as to the direct utility of atmospheric moisture, as such, to actively vegetating plants. What I have seen tends to create in my own mind a doubt of any such utility.

The Ames Laboratory, North Easton.

FURTHER ADDITIONS TO THE FLORA OF THE AMHERST REGION.

Roland M. Harper.

On examining recently a copy of Tuckerman and Frost's Catalogue of plants growing without cultivation within thirty miles of Amherst College (1875), I found that several plants which I had collected or observed within the limits of this catalogue during the past season were not mentioned in it.

A circle of thirty miles radius, with Amherst College as its center, would include, along its eastern edge, the greater part of Sturbridge, the whole of Brookfield, and several other towns in Worcester and Hampden Counties which I explored more or less in 1899.

The plants listed below are from these towns, and unless otherwise noted are new to the "Amherst region." Stations enclosed in parentheses have been already mentioned in my last list of additions to the flora of Worcester County (Rhodora, 1: 201–205), where further details concerning them may be found.

Potamogeton gemmiparus, Robbins. In Quaboag Lake, Brookfield, September 4 (altitude 615 feet). Also in a small pool in a meadow in Sturbridge, September 17 (altitude 560 feet). This species was collected in Amherst in September, 1874, by Prof. H. G. Jesup, but it

is not mentioned in Tuckerman's or any other list of the plants of that region. With this single exception, my two stations seem to be the farthest west of any of the few known stations for this plant.

Aristida gracilis, Ell. (Sturbridge).

Scirpus atrocinctus, Fernald. (New Braintree, Dana.)

Eriophorum gracile, var. *paucinervium*, Engelm. (Sturbridge.)

Carex bullata, Schk. Quaboag River marshes, West Brookfield, May 30 (altitude 610 feet). This species is perhaps more local in its distribution than might be supposed. It seems to be unknown in Vermont and Connecticut, and is considered very rare in New York (E. C. Howe in Rep. N. Y. Mus., **48**: 103).

Carex stricta, var. *strictior*, Dew. (Sturbridge.)

Carex muricata, L. Dry grassy roadside, Hardwick, July 2.

Juncus Greenii, Oakes & Tuckerm. (Brookfield.)

Juncus militaris, Bigel. In water 1–2 feet deep along the northern margin of Quaboag Lake, Brookfield, August 20 (altitude 615 feet).

Polygonum acre, var. *leptostachyum*, Meisn. (Brookfield.)

Polygonum Muhlenbergii, Wats. Lake shores, Brookfield, September 4.

Pyrus nigra, Sargent (*P. arbutifolia*, var. *melanocarpa*, Hook.) Sturbridge, May 28.

Elatine Americana, Arn. (Brookfield).

Sium Carsonii, Durand. Dunn Brook, Brookfield (altitude 625 feet), August 20; Honey Brook, Sturbridge, September 17.

Apocynum hypericifolium, Ait. (Brookfield.)

Myosotis laxa, Lehm. Dunn Brook, Brookfield, August 20.

Antennaria Parlinii, Fernald. (Sturbridge, Warren.)

Antennaria Canadensis, Greene. (Sturbridge.)

Antennaria neodioica, Greene. Sturbridge, Brookfield, West Brookfield, Warren, Brimfield.

Antennaria neglecta, Greene. Brookfield, Wales.

Bidens cernua, L. Margin of Quaboag Lake, Brookfield, September 4; wet meadow, Sturbridge, September 17.

The following plants which are not in Tuckerman and Frost's catalogue have been reported from the region by more recent writers (N. A. Cobb, List of plants found growing wild within thirty miles of Amherst, 1887; H. L. Clark, Rhodora **1**: 164), but as they probably are not generally distributed in this region, my stations for them may be of some interest: —

Trifolium hybridum, L. Roadsides, North Brookfield, June 18, New Braintree and Athol, July 2.

Carum Carui, L. Brookfield, May 30.

Clethra alnifolia, L. About ponds, lakes, and rivers, Sturbridge and Brookfield. Though quite common in Worcester County, this plant probably reaches its inland limit in the Amherst region.

Bidens Beckii, Torr. Quaboag Lake, Brookfield, September 4. (Shown to me by Dr. G. E. Stone.) All the specimens seen were sterile.

Columbia University.

Polymnia Canadensis in Vermont. — In the sixth edition of Gray's Manual *Polymnia Canadensis*, L., is reported from Western Vermont and Connecticut, while in the Illustrated Flora western Ontario, is assigned as the eastern limit of the plant. Diligent inquiry regarding the station in Vermont, failed to show upon what foundation the report in Gray's Manual rested. Fortunately, however, the occurrence of the species within the state was settled last August, by the discovery of a fine station at the base of limestone cliffs at Double Road Crossing, plants being found both in Rutland and Proctor at points fully half a mile apart. — Willard W. Eggleston, Rutland, Vermont.

AN UNUSUAL FORM OF DROSERA INTERMEDIA, VAR AMERICANA.

J. R. Churchill.

(Plate 15, fig. 8.)

Along the northern shore of Ponkapog Pond, in Canton and Randolph, Massachusetts, stretches an extensive bog. Almost inaccessible from the land side, towards the pond it becomes muddy, rotten, and partially submerged, indeed, a veritable morass. I have approached it by boat, and, under favorable conditions, have occasionally ventured upon it to collect the aquatic and amphibious plants which find a congenial home in such a place. Scheuchzeria is very abundant, and I have never happened to find the pretty Mud Sedge (*Carex limosa*, L.) at any other station near Boston. There are Pitcher-plants, Utricularias and Sundews, of course; but a little colony of long-

leaved Sundews (*Drosera intermedia* Hayne, var. *Americana*, DC.), which I collected here on July 4, 1898, were behaving in such unusual fashion that it seems proper to record it.

Our Sundews are all "stemless" plants, so called; that is to say, the leaves are all tufted at the base of the flower-stock in a rosette upon the ground. When, however, this long-leaved species gets into deep water, it gets out by raising this basal rosette of leaves, and the flower-stalk, "on its prolonged caudex" (Gray, Manual, 6th ed. p. 178), the "rootstock" (not the stem), "is elongated two to four inches when growing in water" (Britt. & Brown, Ill. Flora, II, p. 161). And we often find such specimens with the tuft of root-leaves many inches from the ground, after the water has perhaps subsided. Now, these long-leaved Sundews at Ponkapog were growing upon a floating mud-bank, and, though but little submerged, they were getting up, not at all by the elongation of the rootstock, as prescribed, but by the elongation of the stem proper, thus transforming our stemless Drosera into a long-stemmed plant with scattered leaves. The leaves were no longer tufted at the base, but by the lengthening of the internodes were now disposed separately along the stem.

This is so well shown by the figure which Mr. Faxon has kindly drawn that little further description is needed. The plants were from six to ten inches high, not more than two inches below the water, and branched from the base. There were no traces of flowers or fruit; the unusual development of stem and leaf had apparently exhausted the plant and rendered it sterile.

The significance of this unusual development remains in doubt. Some exotic members of this family are caulescent. Is this a reversion to an ancient type, which is so often suggested or indicated by such abnormal growths? Or are these individuals the forerunners or advance guard in their species, progressing through evolution and natural selection towards a superior and more advantageous form, to which their related species have long ago attained? — J. R. Churchill, Boston.

Explanation of Plate 15, fig 8. Caulescent form of *Drosera intermedia*, var. *Americana*.

Russula emetica in Vermont. — *Russula emetica* Fr. has been frequently reported for the United States, but, until last October, I had failed to collect specimens clearly referable to it. Its close relative

Russula fragilis (Pers.) Fr. has been found from time to time, but always of small size and with the lamellae too crowded to be regarded as *R. emetica.*

On October 14 last I collected *Russula emetica* in ample quantity in a sphagnum bog on Grand View Mt., Vt. The specimens were growing scattered about in sphagnum under the small trees and bushes which thinly cover the marginal portions of the bog. The habitat is so peculiar that, if characteristic, it may be of aid in locating this species elsewhere.

The specimens were as watery as an Hygrophorus when collected and very fragile: pileus 5–8 cm. diameter, viscid, depressed, margin at length somewhat sulcate, cuticle separable; flesh white, red beneath the cuticle, very acrid; stem white, softer within, firm at first; lamellae white, remaining white, subdistant, free or adnexed, equal, edge not eroded; spores white, echinulate. — E. A. Burt, Middlebury, Vermont.

Dr. Burt's note on Russula Emetica should receive attention from the many collectors of toadstools, who, without study of the inconspicuous differences which separate one member of the genus from another, are prone to apply the name of this particular species to any red Russula with an acrid taste — or at least to any that may at the same time be viscid, red, and acrid. So used, the name of *Russula emetica* commonly serves as a convenient designation for those specimens that in the process of sorting out such as are fit for eating are discarded on account of their taste. The real *Russula emetica* is doubtless known to few, though it is, after Amanita, perhaps the most frequently mentioned of noxious species.

As to its edible possibilities (and such possibilities nowadays seem to attract mycophagists even more keenly than established actualities) there is in the records much difference of opinion. Uncooked, however, acrid Russulas are certainly poisonous; yet there is good weight of evidence that they may be so treated as to be harmless.

Even the tasting process has its discomforts, if not its dangers, in the case of these acrid Russulas. Some years ago the writer was one of an active party that brought well-filled baskets out of the Holliston (Mass.) woods. During the drive to the railway station one of the ladies occupied herself in sorting her red-topped Russulas — in the approved way. Her basket was large and her collection ample, most of the specimens being of acrid sorts. By the time the station was reached

some dozens had been tasted and thrown away. Although no ill effects were felt immediately by the taster, beyond some discomfort in the tongue, it was not long before more serious trouble appeared in the shape of disturbances of the digestive system and other symptoms of irritant poisoning. For several days the ill effects were seriously felt, and a partial paralysis of the sense of taste, and a burry, or sand-papery feeling of the tongue lasted for some time longer. Such an experience may well be avoided by all who care to take warning. — H. W.

THE LOCAL FLORAS OF NEW ENGLAND (ADDENDA).

MARY A. DAY.

(*Concluded.*)

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Vol. 2, No. 14, including pages 27 to 52, was issued February 7, 1900.

C. E. Faxon, del.

BARTONIA AND DROSERA.

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